



# Test Report: DRDN20-48

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20A Enclosed Type Redundancy Module

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

## ■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

## ■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

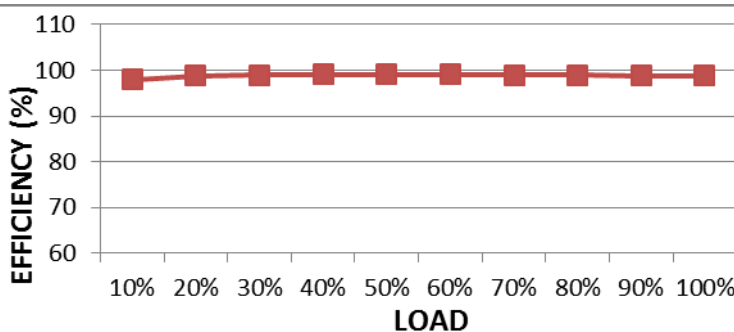
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED CURRENT	0~20A CONTINUOUS	I/P : 48VDC O/P : FULL LOAD Ta : 25°C	OK
2	PEAK CURRENT	30A 5Sec NO DAMAGE	I/P: 48VDC O/P : 30A Ta:25°C	OK
3	CAPACITANCE	320uF	I/P : 48VDC O/P : 320uF Ta : 25°C	OK
4	STANDBY POWER LOSSES (Typ.)	1.5W	I/P : 48VDC O/P : NO LOAD Ta : 25°C	0.76W

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	36VDC~60VDC	I/P:TESTING O/P:FULL LOAD Ta:25°C	33.82VDC~61.84VDC
2	RATED CURRENT	0~10Ax2 input, 0~20Ax1 input Continuous	I/P : 48VDC O/P: 20A Ta:25°C	OK
3	VOLTAGE DROP (Vin-Vout) (max.)	0.2V	I/P : 48VDC O/P : FULL LOAD Ta : 25°C	0.12V
4	PEAK CURRENT	0~15Ax2 input, 0~30Ax1 5Sec NO DAMAGE	I/P: 48VDC O/P : 30A Ta:25°C	OK
5	INPUT REVERSE CURRENT (max.)	1mA	I/P : 65VDC O/P : FULL LOAD Ta : 25°C	2.11uA
6	INPUT REVERSE VOLTAGE (max.)	65Vdc NO DAMAGE	I/P : 65VDC O/P : FULL LOAD Ta : 25°C	OK
7	EFFICIENCY(Typ.)	98%	I/P:48VDC O/P:FULL LOAD Ta:25°C	99.56 %

EFFICIENCY vs LOAD



**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	<30A No damage 5 sec (max)	I/P:48VDC O/P:30A Ta:25°C	NO DAMAGE
2	SHORT PROTECTION	<30A No damage 5 sec (max)	I/P: 60VDC O/P: FULL LOAD Ta:25°C	NO DAMAGE

**CONTROL FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RELAY	30VDC/1A RESISTIVE LOAD	I/P:48VDC O/P:FULL LOAD Ta:25°C	TEST : OK
2	REDUNDANCY	For 1+1 redundancy,and support N+1 redundancy	I/P:48VDC O/P:FULL LOAD Ta:25°C	TEST :OK
3	BOTH INPUTS VOLTANG ALARM	<34.2V OR> 63V (±5%)	I/P:TESTING O/P:FULL LOAD Ta:25°C	TEST :OK
4	LED STATUS DISPLAY	GREEN LED OK	I/P:48VDC O/P:FULL LOAD Ta:25°C	TEST :OK

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Transistor Peak Voltage	Q1 VGS Rated : ±20V  Q3 VGS Rated : ±20V	I/P:60VDC DC ON/OFF O/P:FULL LOAD Ta:25°C	Q1 VGS:12.4V  Q3 VGS:12.2V

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P/O/P-FG: 0.5KVAC/min I/P/FG-RELAY :0.5KVAC/min FG-RELAY:0.5KVAC/min	I/P/O/P-FG: 0.6 KVAC/min I/P/FG-RELAY: 0.6 KVAC/min O/P-FG:0.6 KVAC/min Ta:25°C	I/P/O/P-FG:7.98mA I/P/FG-RELAY:0.282mA FG-RELAY:0.270m A NO DAMAGE
2	ISOLATION RESISTANCE	I/P/O/P-FG:500VDC>100MΩ I/P/FG-RELAY: 500VDC>100MΩ FG-RELAY:500VDC>100MΩ	I/P/O/P-FG: 500 VDC I/P/FG-RELAY: 500 VDC FG-RELAY: 500 VDC Ta:25°C	I/P/O/P-FG: 9999MΩ I/P/FG-RELAY: 9999MΩ FG-RELAY:9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	7 mΩ

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	☑EN55032 CLASS B	I/P : 48VDC O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab

2	RADIATION	<input checked="" type="checkbox"/> EN55032 CLASS B	I/P : 48VDC O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
3	E.S.D	EN61000-4-2 AIR: 15KV / Contact: 8KV	I/P : 48VDC O/P : FULL LOAD Ta : 25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
4	E.F.T	EN61000-4-4 <input checked="" type="checkbox"/> INDUSTRY INPUT : 2KV	I/P : 48VDC O/P : FULL LOAD Ta : 25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
5	SURGE	IEC61000-4-5 <input checked="" type="checkbox"/> LIGHT INDUSTRY L-N : 1KV L,N-PE : 2KV	I/P : 48VDC O/P : FULL LOAD Ta : 25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
6	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report			

## ■ RELIABILITY TEST

### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																				
1	TEMPERATURE RISE TEST	MODEL : ERDN20-48 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 48VDC O/P : FULL LOAD Ta= 24.8 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 48VDC O/P : FULL LOAD Ta= 60.3 °C																																																																																						
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 24.8 °C</th> <th>HIGH AMBIENT Ta= 60.3 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>ZNR1</td><td>39.1°C</td><td>76.3°C</td></tr> <tr><td>2</td><td>Q1</td><td>50.8°C</td><td>90.5°C</td></tr> <tr><td>3</td><td>Q3</td><td>42.2°C</td><td>78.8°C</td></tr> <tr><td>4</td><td>C17</td><td>39.3°C</td><td>76.2°C</td></tr> <tr><td>5</td><td>C15</td><td>39.4°C</td><td>76.0°C</td></tr> <tr><td>6</td><td>C16</td><td>39.0°C</td><td>75.6°C</td></tr> <tr><td>7</td><td>RY1</td><td>42.0°C</td><td>77.8°C</td></tr> <tr><td>8</td><td>RY2</td><td>39.3°C</td><td>76.2°C</td></tr> <tr><td>9</td><td>U1</td><td>43.0°C</td><td>79.3°C</td></tr> <tr><td>10</td><td>U2</td><td>36.6°C</td><td>73.1°C</td></tr> <tr><td>11</td><td>U4</td><td>40.0°C</td><td>75.8°C</td></tr> <tr><td>12</td><td>D3</td><td>46.0°C</td><td>81.8°C</td></tr> <tr><td>13</td><td>R54</td><td>40.4°C</td><td>76.4°C</td></tr> <tr><td>14</td><td>R56</td><td>39.9°C</td><td>75.9°C</td></tr> <tr><td>15</td><td>Q13</td><td>46.4°C</td><td>81.9°C</td></tr> <tr><td>16</td><td>Q14</td><td>47.1°C</td><td>83.0°C</td></tr> <tr><td>17</td><td>R48</td><td>47.3°C</td><td>83.1°C</td></tr> <tr><td>18</td><td>C4</td><td>40.2°C</td><td>76.4°C</td></tr> <tr><td>19</td><td>Q21</td><td>37.1°C</td><td>73.2°C</td></tr> <tr><td>20</td><td>PCB</td><td>50.0°C</td><td>88.2°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 24.8 °C	HIGH AMBIENT Ta= 60.3 °C	1	ZNR1	39.1°C	76.3°C	2	Q1	50.8°C	90.5°C	3	Q3	42.2°C	78.8°C	4	C17	39.3°C	76.2°C	5	C15	39.4°C	76.0°C	6	C16	39.0°C	75.6°C	7	RY1	42.0°C	77.8°C	8	RY2	39.3°C	76.2°C	9	U1	43.0°C	79.3°C	10	U2	36.6°C	73.1°C	11	U4	40.0°C	75.8°C	12	D3	46.0°C	81.8°C	13	R54	40.4°C	76.4°C	14	R56	39.9°C	75.9°C	15	Q13	46.4°C	81.9°C	16	Q14	47.1°C	83.0°C	17	R48	47.3°C	83.1°C	18	C4	40.2°C	76.4°C	19	Q21	37.1°C	73.2°C	20	PCB	50.0°C	88.2°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 48 VDC O/P : 115% LOAD Ta : 25°C	TEST : OK																																																																																				



3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 36VDC/60VDC O/P : 100 % LOAD Ta= -45°C	TEST : OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C /95 %R.H NO DAMAGE	I/P : 6 0VDC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK
5	TEMPERATURE COEFFICIENT	± 0.03%/°C (0~60°C)	I/P : 48VDC O/P : FULL LOAD	± 0.011%/°C (0~60°C)
6	STORAGE TEMPERATURE TEST	-40~85°C	1. Thermal shock Temperature : -45°C~ +90°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : STATIC	
7	THERMAL SHOCK TEST	-40~60°C	1. Thermal shock Temperature : -45°C~ +65°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 15cycle:48VDC/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:48VDC/ FULL LOAD Burn In Test	
8	VIBRATION TEST	10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 6G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C	
9	CAPACITOR LIFE CYCLE	SUPPOSE C17 IS THE MOST CRITICAL COMPONENT (1) I/P : 48VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 48VDC O/P : FULL LOAD Ta= 60 °C LIFE TIME (3) I/P : 48VDC O/P : 75% LOAD Ta= 60 °C LIFE TIME (4) I/P : 48VDC O/P : 50% LOAD Ta= 60 °C LIFE TIME		(1) 655910 HRS (2) 52613HRS (3) 81989 HRS (4) 113563 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1853.5K hrs min. Telcordia SR-332 (Bellcore) ; 378.7K hrs min. MIL-HDBK-217F (25°C)		
11	Ongoing Reliability Test	I/P : 48VDC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 30000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

2018.4.30 GP-A50-F010